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|    |                                 | Job No 24590                    |                        |
| Bechtel National, Inc.  |                                 |                                 |                        |
| <b>SUPPLIER DOCUMENT STATUS</b>   |                                 |                                 |                        |
| 1. <input checked="" type="checkbox"/> Work may proceed.  |                                 |                                 |                        |
| 2. <input type="checkbox"/> Revise and resubmit. Work may proceed subject to resolution of indicated comments.  |                                 |                                 |                        |
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| 4. <input type="checkbox"/> Review not required. Work may proceed.  |                                 |                                 |                        |
| Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations. |                                 |                                 |                        |
| REVIEWED  |                                 |                                 | E+NS<br>jm             |
| G-321 Document Category <u>N/A</u><br>[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]  |                                 |                                 |                        |
| Supersedes BNI Document No. <u>N/A</u> Rev. _____<br>[When applicable]  |                                 |                                 |                        |
| Accepted by   | <u>DC Pfluger</u><br>Print Name | <u>[Signature]</u><br>Signature | <u>3/11/04</u><br>Date |
| Released by   | <u>N/A</u><br>Print Name        | _____<br>Signature              | _____<br>Date          |
| 416 GP&S 7-03   |                                 |                                 |                        |

24590-CM-HC4-HXYG-00138-02-00015  
REV. 00A

**SUBCONTRACT SUBMITTAL**

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COGEMA-IA-039, Rev. 0

**IQRPE REVIEW –  
PRETREATMENT FACILITY (PTF), RADIOACTIVE LIQUID WASTE DISPOSAL  
SYSTEM (RLD) ALKALINE EFFLUENT VESSELS (RLD-VSL-00017A/B)**

"I, Tarlok S. Hundal, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Pretreatment Facility (PTF), Radioactive Liquid Waste Disposal System (RLD) Alkaline Effluent Vessels (RLD-VSL-00017A/B) as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs, i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is six (6) sheets numbered one (1) through six (6).



T. S. Hundal  
Signature

3/9/04  
Date

24590-CM-HC4-HXYG-00138-02-00015, REV. COA

**STRUCTURAL INTEGRITY ASSESSMENT OF THE  
PRETREATMENT FACILITY (PTF), RADIOACTIVE  
LIQUID WASTE DISPOSAL SYSTEM (RLD)  
ALKALINE EFFLUENT VESSELS  
(RLD-VSL-00017A/B)**

**COGEMA-IA-039  
REV. 0**

**Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.**

**Pretreatment Facility (PTF), Radioactive Liquid Waste Disposal System (RLD),  
Alkaline Effluent Vessels, RLD-VSL-00017A/B**

COGEMA-IA-039, Rev. 0

|                       |   |   |
|-----------------------|---|---|
| Scope                 | Scope of this Integrity Assessment                  | This integrity assessment includes two RLD Alkaline Effluent Vessels: RLD-VSL-00017A/B, located in cell (P-0118) at Elevation 0'-0" in the Pretreatment Facility.   |
| References            | Specifications, Drawings and Mechanical Data Sheets | <p>The following Specifications are listed in Material Requisition No. 24590-CM-MRB-MVA0-00001, Rev. 1</p> <p>Engineering Specification for Pressure Vessel Design and Fabrication;<br/> Engineering Specification for Seismic Qualification Criteria for Pressure Vessels;<br/> Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers;<br/> General Specification for Supplier Quality Assurance Program Requirements;<br/> Specification for Positive Material Identification (PMI);<br/> General Specification for Packing, Shipping, Handling, and Storage;<br/> Engineering Specification for Pressure Vessel Fatigue Analysis;<br/> Engineering Specification for Seismic Qualification Criteria for Pressure Vessels;<br/> Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks.</p> <p>Drawings:<br/> 24590-PTF-MV-RLD-00001, Rev. 0, Equipment Assembly Alkaline Effluent Vessel, (RLD-VSL-00017A);<br/> 24590-PTF-MV-RLD-00002, Rev. 0, Equipment Assembly Alkaline Effluent Vessel, (RLD-VSL-00017B);<br/> 24590-PTF-P1-P01T-P0001, Rev. 2, Pretreatment Facility General Arrangement Plan at El. 0'-0";<br/> 24590-PTF-P1-P01T-P0010, Rev. 3, Pretreatment Facility General Arrangement Section D-D;<br/> 24590-PTF-P1-P01T-P0011, Rev. 4, Pretreatment Facility General Arrangement Section E-E;<br/> 24590-PTF-M5-V17T-P0022003, Rev. 0, Process Flow Diagram Pretreatment Facility.</p> <p>Mechanical Data Sheets:<br/> 24590-PTF-MVD-RLD-00005, Rev.0, Mechanical Data Sheet for Alkaline Effluent Vessel (RLD-VSL-00017A);<br/> 24590-PTF-MVD-RLD-00006, Rev.0, Mechanical Data Sheet for Alkaline Effluent Vessel (RLD-VSL-00017B).</p> |
| Summary of Assessment |   | <p>For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, <i>Dangerous Waste Regulations</i> for Tank Systems.</p>   |

**Pretreatment Facility (PTF), Radioactive Liquid Waste Disposal System (RLD),  
Alkaline Effluent Vessels, RLD-VSL-00017A/B**

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| Information Assessed  | Source of Information   | Assessment   |
|---|---|--|
| <p><b>Design</b></p> <p>Vessel design standards are appropriate and adequate for the vessel's intended use.</p> | <p>Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References;</p> <p>24590-PTF-3YD-PWD-00001, Rev. 1, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD.</p> | <p>The RLD system Alkaline Effluent Vessels, RLD-VSL-00017A/B vessel and all appurtenances are to be designed to the ASME Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. The vessels are subjected to cyclic loading. The fatigue design standards, ASME Section VIII, Division 2, are appropriate for components with high number of load cycles. These are adequate and acceptable design standards. The vessels are vertical vessels with a 192 in. ID and a height of 210 in. from bottom tangent line to top tangent line supported on a cylindrical skirt (1" thick by approx. 6'-0" high plate) which in turn is supported on a base beam ring anchored to the concrete floor at Elev. 0'-0". The vessels' top and bottom heads are semi-elliptical, built with 1" minimum thick plate. The shell is also specified to be made of 1" thick plate. The vessel has an internal jet mixer supported from bottom head and a dip pipe supported from the tank top. Material for the shell, vessel heads, vessel's internal equipment, and supporting skirt is SA-240 304 stainless steel (0.030% maximum carbon content, dual certified), will hereafter be referred to as 304. The operating vessel volume is to be about 28,110 gallons and the total internal volume is to be about 34,340 gallons.</p> |

| <b>Pretreatment Facility (PTF), Radioactive Liquid Waste Disposal System (RLD),<br/>Alkaline Effluent Vessels, RLD-VSL-00017A/B</b> |   |  | <b>COGEMA-IA-039, Rev. 0</b>   |  |
|---|---|--|--|--|
| <b>Information Assessed</b>   |   | <b>Source of Information</b>   | <b>Assessment</b>  |  |
| <b>Design</b>   | <p>If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.</p>                                    | <p>Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References;</p>   | <p>The RLD Alkaline Effluent Vessels, RLD-VSL-00017A/B are standard ASME Section VIII vessels. The Mechanical Data Sheets require that the ASME Section VIII, Division 1 vessels be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. As discussed above, the vessel design standards are appropriate and adequate for the vessel's intended use.</p>  |  |
|   | <p>Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.</p> | <p>Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References;</p> <p>24590-PTF-3YD-PWD-00001, Rev. 1, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD.</p> | <p>The Mechanical Data Sheets identify the vessels' operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, and the vessel quality level which determines the requirements for seismic design. The design specifications for the vessels require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME Section VIII, Div. 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 2 design rules to address seismic design and analysis of the vessel and vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III/IV Equipment and Tanks. These codes and standards are adequate and appropriate for design of the RLD vessels to withstand operating pressure and temperature loads and seismic loads for the specified design life.</p> |  |

| Pretreatment Facility (PTF), Radioactive Liquid Waste Disposal System (RLD),<br>Alkaline Effluent Vessels, RLD-VSL-00017A/B |  |  | COGEMA-IA-039, Rev. 0  |  |
|---|--|--|--|--|
| Information Assessed  |  | Source of Information  | Assessment   |  |
| <b>Foundation</b>   | Vessel foundation will maintain the load of a full vessel. | Specifications listed under Material Requisition above under References;<br><br>24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design. | The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV Code, Section VIII, Division 1 for design of the vessel supports. This code ensures an adequate design for the vessel supports. Chapter 14 of the Basis of Design document requires that vessel foundations design must be adequate to support the loads from full vessels. |  |
|   | If in an area subject to flooding, the vessel is anchored. | Specifications listed under Material Requisition under References.   | Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Specification for Pressure Vessel Design and Fabrication.   |  |
|   | Vessel system will withstand the effects of frost heave.   | 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.   | The Basis of Design document requires that all structural foundations for outdoor equipment to extend a distance below grade that exceeds the 30" depth of the frost line. These vessels are located inside/interior of the building at (Elevation 0'-0" level with 8 ft thick foundation mat), therefore, the vessel foundation is not subject to frost heave.                    |  |

**Pretreatment Facility (PTF), Radioactive Liquid Waste Disposal System (RLD),  
Alkaline Effluent Vessels, RLD-VSL-00017A/B**

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| Information Assessed  | Source of Information  | Assessment   |
|---|--|--|
| <p>Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)</p> | <p>Mechanical Data Sheets listed above under References;</p> <p>Vessel/Tank Material Selection Data Sheet, 24590-PTF-N1D-RLD-P0002, Rev. 0, RLD-VSL-000017A/B (PTF) Alkaline Effluent Vessels;</p> <p>24590-WTP-PSAR-ESH-01-002-02, Rev. 1a, Preliminary Safety Analysis Report: PT Facility Specific Information;</p> <p>Department of Ecology Permit # WA7890008967, <i>Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste</i>, Chapter 10, and Attachment 51, "Hanford Tank Waste Treatment and Immobilization Plant."</p> | <p>The Mechanical Data Sheets present the waste specific gravity, storage temperatures and pressures. The Vessel/Tank Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the PTF Building and in Part A of the Permit as an integral part of the design process. The RLD vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. Each vessel is provided with an air in-bleed to dilute any hydrogen generated in the vessel. Each vessel also has an operating jet mixer to mitigate any such gas buildup in the waste. The vessels are actively vented via PTF vent system to prevent any build-up of flammable gases. The vessel is grounded to control ignition sources.</p> |
| <p>Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.</p>   | <p>Vessel/Tank Material Selection Data Sheet, 24590-PTF-N1D-RLD-P0002, Rev. 0, RLD-VSL-000017A/B (PTF) Alkaline Effluent Vessels;</p> <p>24590-PTF-3YD-PWD-00001, Rev. 1, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD.</p>  | <p>The Vessel/Tank Material Selection Data Sheet demonstrates that the vessel is designed to process the wastes discussed above. The System Description discusses normal and abnormal operations for the RLD vessels. Acid or water will be used for flushing/rinsing.</p>   |
| <p>The waste types are compatible with each other.</p>  | <p>24590-PTF-3YD-PWD-00001, Rev. 1, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD.</p>  | <p>The System Description for the PTF (RLD) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The primary function of these vessels is to receive, store, and discharge low activity alkaline and other suspect active effluent generated within the PT and receive caustic scrub solution from LAW Vitrification Plant. These vessels' effluent is sent to Pretreatment Facility's process condensate tanks (RLD-TK-00006A/B) for further processing.</p>   |

**Waste Characteristics**

| Pretreatment Facility (PTF), Radioactive Liquid Waste Disposal System (RLD),<br>Alkaline Effluent Vessels, RLD-VSL-00017A/B |                       | COGEMA-IA-039, Rev. 0 |  |
|---|-----------------------|-----------------------|--|
| Information Assessed  | Source of Information | Assessment            |  |

|                      |   |  |   |
|----------------------|---|--|---|
| Corrosion Protection | Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system) | Drawings and Mechanical Data Sheets listed above under References;<br><br>Vessel/Tank Material Selection Data Sheet, 24590-PTF-N1D-RLD-P0002, Rev. 0, RLD-VSL-000017A/B (PTF) Alkaline Effluent Vessels;<br><br>24590-PTF-3YD-PWD-00001, Rev. 1, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD. | The Vessel/Tank Material Selection Data Sheet shows that the RLD Alkaline Effluent Vessels, RLD-VSL-00017A/B normally operate at atmospheric pressure, pH 13, and at 75 °F temperature. The vessels are designed for 15 psig pressure and a temperature of 150 °F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheets. Potential acid cleaning operations of the vessel were also considered. The material selected is 304 and a corrosion allowance of 0.08 in. The RLD vessels are located in the PTF cell (P-0118) at elevation 0'-0". This cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life. |
| Corrosion Allowance  | Corrosion allowance is adequate for the intended service life of the vessel.  | Mechanical Data Sheets listed above under References;<br><br>Vessel/Tank Material Selection Data Sheet, 24590-PTF-N1D-RLD-P0002, Rev. 0, RLD-VSL-000017A/B (PTF) Alkaline Effluent Vessels;  | The bases for the RLD vessels' material selection and corrosion allowance are furnished in the Vessel/Tank Material Selection Data Sheet. Selection of 304 materials with a corrosion allowance of 0.08 in. for a service life of 40 years is adequate and appropriate. The material selection and corrosion allowance are carried forward to the Mechanical Data Sheets consistently and correctly.  |
| Pressure Relief      | Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.   | Drawings listed above under References;<br><br>24590-PTF-3YD-PWD-00001, Rev. 1, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD.  | The RLD Alkaline Effluent Vessels, RLD-VSL-00017A/B are designed to overflow into each other but ultimately overflow to the ultimate overflow vessel (PWD-VSL-00033) through an 8" diameter unrestricted line. Vessel (PWD-VSL-00033) is located at Elevation (-) 45'-0" of the PTF, as shown on the drawings and described in the System Description document. The RLD vessels are also connected to the PTF vessel vent system to prevent over pressurization of the vessel.  |